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SOME NEW ASPECTS OF THE FERN PLATYZOMA MICROPHYLLUM

ALICE F. TRYON

Since this north Australian fern was described by Robert Brown in 1810 and placed in the *Gleicheniaceae*, it has been the subject of several papers. Because of its unusual stelar structure and absence of leaf gaps it was considered particularly in theories relating to the origin of the stele. In the most recent of these morphological studies by J. M. Thompson (1919) the literature is reviewed. F. O. Bower (1926) in his survey of the primitive ferns cites Thompson's work and figures the reconstruction of the stele and the irregularities of the sporangium. In connection with his studies on the *Gleicheniaceae*, R. E. Holttum (1956) has discussed the relationships of *Platyzoma*. He excludes it from that family on the basis of the filiform leaves, the occurrence of waxy indument and the terminal position and characters of the sporangium. He tentatively refers it to a place among the gymnogrammoid ferns on evidence drawn from a comparison with *Jamesonia*. While there are good reasons for excluding *Platyzoma* from the *Gleicheniaceae*, there are some objections to its close alliance with *Jamesonia*. A study of *Platyzoma* was undertaken in search of new evidence which might help to establish its relations more certainly. Observations have been made on the following specimens in the Gray Herbarium and the United States National Herbarium[1].

[1]I am most grateful for the loan of specimens from the United States National Herbarium, and for the opportunity to study the collections and the use of facilities at the Gray Herbarium.

AUSTRALIA. QUEENSLAND: near Hughenden, *Brass & White 64* (fragment GH ex K); northern Queensland, *Hann* (US); Thursday Island, *N. J. Hey*, in 1917 (US); Dimbulah, Cook District, *Hubbard & Winders 6856* (US); Hughenden, Burke District, *Hubbard & Winders 7592* (US); Rockingham Bay, *F. Müller* (GH); between Inglewood and Millmerran, Darling Downs, *C. T. White 9705* (GH); between Cecil Plains and Millmerran, Darling Downs, *White & Webb 1177* (GH). NORTHERN TERRITORY: east of Borroloola, *R. A. Perry 1851* (US); east of Carlton Station, *R. A. Perry 3005* (US); in Gulf of Carpentaria, Groote Eylandt, *R. L. Specht 197* (US); Port Bradshaw, Arnhem Land, *R. L. Specht 716* (US); Oenpelli, Arnhem Land, *R. L. Specht 1252* (US). WESTERN AUSTRALIA: Cambridge Gulf, *F. Müller*, (GH); east of Kimberly Research Station, *R. A. Perry 2566* (US).

Observations on Platyzoma microphyllum

Roots. — The roots are long, coarse and of a diameter nearly equal to that of the petioles. They arise from the lower surface of the rhizome. The outer tissue of the roots appears spongy and consists of large, lustrous, light brown, parenchyma cells. Long persistent root hairs arise from the surface of these cells forming dense mats in which particles of white sand may be enmeshed.

Rhizome. — The rhizome is dorsiventral, ca. 0.4 cm. in diameter with a tomentum of rigid, concolorous, lustrous, rust colored, multicellular trichomes. The trichomes are relatively long and consist of about 30 - 60 cells (Fig. 1). These cells are as long as or up to four times longer than broad, and are not arranged in any regular sequence of size. The base of the trichome may be catenate (Fig. 2); the cells being flattened and twisted. The terminal cell is short and bulbous. The leaves are close but irregularly placed on the rhizome or fasciculate. Many arise from the upper and lateral surfaces but some of the pinnate leaves and most of the filiform ones arise from the lower surface of the rhizome. The longest rhizome (with attached leaves) was 4 cm. long and there were 4 circinate leaves at the apex, 34 pinnate leaves and about 50 filiform leaves. The filiform leaves in some specimens are fascicled while in others they are quite uniformly distributed along the entire rhizome. Details of the structure of the rhizome are given by Thompson (1916). It is described as a medullated protostele with

a discontinuous inner endodermis and lacking leaf gaps.

Pinnate leaves. — Fully developed leaves have an expanded apex with a terminal pinna although many leaves are not entirely developed. In the smallest complete leaf the petiole was 2.5 cm. long, the lamina 11.0 cm. long and 0.3 cm. wide. The lamina of the longest leaf, with a broken apex, was 32.0 cm. long, 0.4 cm. wide and the petiole was 8.0 cm. long. Most leaves are about 24.0 cm. long.

PETIOLE: The petiole is terete or oval near the rhizome, atro-purpureous and with sparse, multicellular, capitate trichomes similar to those of the rhizome. At the apex of the petiole the adaxial half is flattened in three planes and the abaxial half is convex. There are no stomata on the petiole but small mounds of sclerotic tissue rarely occur.

RACHIS: The adaxial surface of the rachis is flat, slightly lighter in color than the petiole or sometimes greenish. The lateral surfaces, on which the pinnae are borne, are flat or slightly grooved. There are abundant, glandular, multicellular trichomes on the lateral and adaxial surfaces of the rachis (Fig. 3). The apical portion of the rachis is attenuate and heavily indumented.

PINNAE: The lamina is once pinnate with about 500 small, simple pinnae which are easily detached from the rachis in dried specimens. Articulation occurs in the stalk without specialized tissue. Most leaves are wholly sterile. Fertile pinnae occur in zones usually in the terminal half or quarter of the lamina and on one or both sides of the rachis. One leaf consisted of 433 pinnae of which 11, borne on one side of the rachis, were fertile. The pinnae are somewhat bladder-shaped with a central slit. The margins are more or less enrolled and nearly meet at the center of the pinna. The pinna *stalk* is usually brown, 0.1 - 0.25 mm. long, 0.2 mm. broad with a cushion of parenchyma cells at the apex which is attached to the lower epidermis and is very glandular. The cells of the *lower epidermis* are thin walled and about 4 to 6 times longer than broad (Fig. 4). In surface view the cell walls are undulate with rounded lobes. Stomata occur only on this surface and are abundant adjacent to the

costa and more diffuse towards the margins. Two- or three-celled, capitate glands (Fig. 5) which secrete copious quantities of yellow wax-like substance, are especially abundant along the veins. The mesophyll is thick and with many large lacunae. The cells of the *upper epidermis* are thick walled and have a shape and a pattern distinct from those of the lower epidermis (Fig. 6). The pattern, which can be observed in dried specimens under 15 × magnifications, consists of a band of elongate cells about 6 to 12 times longer than broad with undulating walls. This band extends through the center of the pinna from the stalk to the apex where it becomes flabellate. Adjacent to it and along the curved sides of the pinna the cells are broader and deeply dissected. The *vascular system* of the pinna is a short sympodium with 6 - 12 lateral branches (Fig. 7). The central vein is slightly flexuous and terminates in an unequal dichotomy. The lateral veins are unbranched and become broader toward their distal end. They terminate well back of the pinna margin and the ends are acute or slightly enlarged. The veins are situated in the spongy mesophyll somewhat closer to the upper than the lower epidermis. They consist of a cord of short, thick-walled tracheids so tightly joined that the entire sympodium can be withdrawn from a pinna softened in sodium hydroxide.

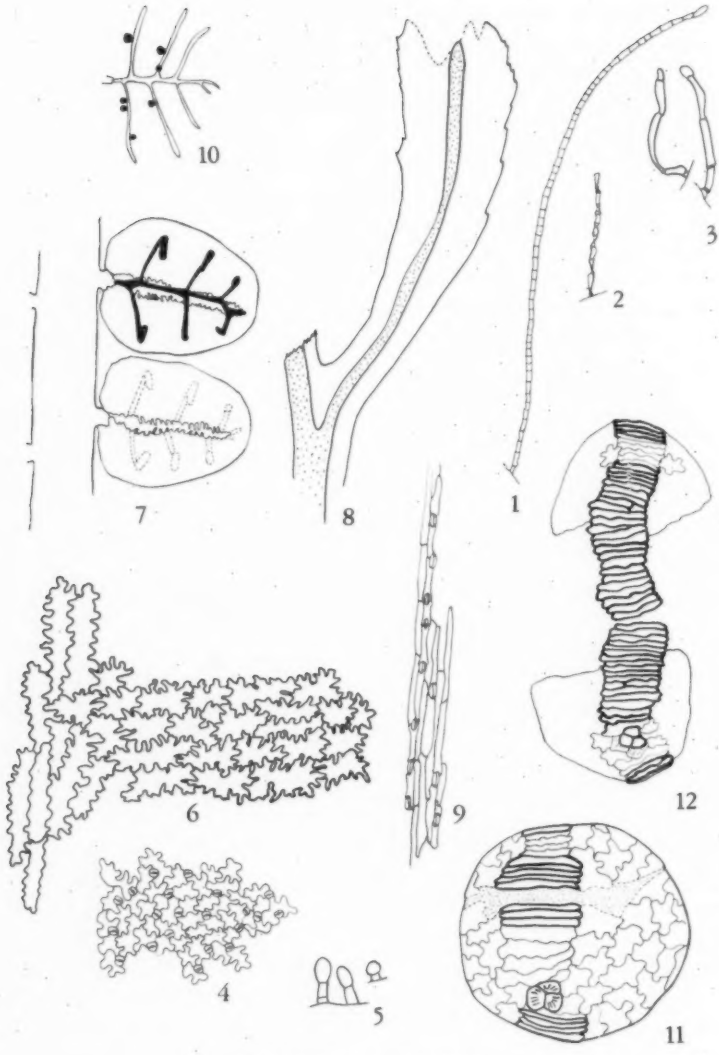
STERILE PINNAE: These are rigid herbaceous, 0.5 - 4.0 mm. long, 0.5 - 2.0 mm. wide, ovate or somewhat orbicular with enrolled margins (Fig. 7). A central slit extends from the stalk to short of the apex and the pinna margins adjoining this are strongly papillate. There are some *unusual pinnae* on the leaves of one collection (*Hubbard & Winders 6856*). The lower pinnae on these are 2 or 3 times as long as the normal ones and clavate or boat-shaped (Fig. 8). The base is narrowed and decurrent on the broad and greenish adaxial surface or on the light brown colored lateral surface of the rachis. If a pinna stalk can be distinguished from the decurrent tissue, it is longer and broader than those of the normal pinnae and only partially brown. The margin is irregular with protruding, elongate cells. The pinna is

thickened on its abaxial surface by a ridge of tissue extending from the stalk to the apex. Such a ridge also occurs in otherwise normal pinnae of the lamina and there seem to be transitional forms between these elongate ones and the normal pinnae.

FERTILE PINNAE: These are slightly larger than the sterile pinnae, orbicular and the margins are not or only slightly enrolled. The papillae from opposite margins may be somewhat enmeshed and close the bladder-shaped pinnae. The fertile pinnae are often a darker brown color and more wrinkled than the sterile pinnae.

Filiform leaves. — These are simple, linear structures with attenuate apices. The apical portion is straw colored or light brown, the basal portion is atropurpureous. They are 3.0 - 8.0 cm. long, 0.05 cm. wide. There are two prominent grooves, presumably on the adaxial side, and two or more shallow ones on the other side extending nearly the length of the leaves. Stomata may be more or less in rows in the shallow grooves (Fig. 9).

Sporangia. — Sporangia are attached along the lateral veins usually nearer to the costa than to the distal end of the vein (Fig. 10). They have been observed on the distal portion of the vein but not in a terminal position. There is considerable variation in the size of the sporangia for among mature ones within the same pinna some may be twice the size of others. There is also variation in the shape, spore content and the position and structure of the annulus. Such irregularities are discussed and illustrated by Thompson (1917, p. 160) and Bower (1926, p. 209). There is however a rather uniform sporangial type which will be described here. Sporangia in several stages of development are found along a single vein and up to 13 have been observed on a single pinna. The sporangium stalk is short, usually of two or three tiers of cells. Three basal cells have been observed in immature sporangia. At the capsular end of the stalk there are either 3 or 4 cells which differ from other stalk cells in having striated thickenings. The capsule of the sporangium is spherical, the annulus is broad, slightly raised



Platyzoma microphyllum

and usually more or less oblique with the capsule faces correspondingly unequal in size (Fig. 11). The annulus (Fig. 12) is composed of a single row of cells which may vary in size and shape, but its width is roughly one third the diameter of the capsule. There are about 40 indurated cells which extend from the base of the capsule around and below its apex. There are about 4 cells with thin and undulating walls which interrupt this annular series. These are followed by 7 - 14 indurated cells similar to those of the annulus. The sporangium opens between these indurated cells at a point usually above their center. There are a few, usually 2 or 4, cells with thin and undulating walls between these indurated ones and the sporangium stalk. The annulus is interrupted by the stalk and the rupture of the sporangium occurs between several indurated cells which resemble those of the longer annular series. A unique characteristic of the sporangium is the cells of the capsule faces (Fig. 11). In surface view these are strongly undulating and somewhat resemble the cells of the lower epidermis.

Spores. — The number of spores in a sporangium and their size seem to correlate with the size of the sporangium. The larger sporangia usually contain 16 large spores and small sporangia contain 32 small spores. There are also sporangia intermediate in size and in one of these, which was open, I found a single large spore nearly filling the capsule and 4 small spores. In six collections examined both 16- and 32-spored sporangia were found on the same pinna. Most

Tracings from cleared material of *Platyzoma microphyllum* — Fig. 1. Rhizome trichome, × 10, *Perry 2566*. Fig. 2. Catenate base from rhizome tricheme, × 15, *Perry 2566*. Fig. 3. Glandular trichomes from rachis, × 35, *White 9705*. Fig. 4. Portion of lower epidermis of pinna, × 45, *Specht 1252*. Fig. 5. Glands from abaxial surface of pinna, × 60, *Specht 197*. Fig. 6. Portion of the upper epidermis of the pinna. Elongated cells at the left are from the central band, × 45, *Specht 1252*. Fig. 7. Sterile pinnae on a portion of the rachis. The venation darkened in the upper; the lower showing the outline of the margins, the veins in broken lines, × 15, *White 9705*. Fig. 8. An elongate pinna, decurrent on a portion of the rachis, the apex torn by flattening, the vascular tissue shaded, × 15, *Hubbard & Winders 8656*. Fig. 9. Portion of the epidermis of a filiform leaf with stomata, × 45, *Specht 1252*. Fig. 10. Vascular system of a pinna with attached immature sporangia, × 15, *Brass & White 64*. Fig. 11. A sporangium with the aperture shaded. With indurated cells above and below the gap, the three celled stalk in the lower part, × 70, *Brass & White 64*. Fig. 12. An opened annulus of a sporangium, with a three celled stalk in the lower part, × 70, *Brass & White 64*.

spores are tetrahedral with a trilete proximal face. In a few sporangia there were also bilateral spores some of which were trilete with ridges of unequal length and others were monolete. The spores are prominently sculptured. The proximal face has long, broad ridges which are somewhat parallel to the commissural ridges and are connected by shorter ones to form a reticulum. The distal face is also prominently sculptured but the rugae are mostly short and form circular or irregular loops. In the equatorial region there may be one or a few parallel ridges nearly continuous around the spore. The spores are often retained in open sporangia. They are also found free within the pinna, sometimes covered with the yellow indument from the glands.

Discussion

Some of these observations are at variance with those previously reported by Thompson and Holttum. The first is the position of the sporangia which Thompson (1916) reports as terminal on the vein ends. Although sporangia may occur on the distal portion of the veins, I have not observed them to be exactly terminal in cleared pinnae. They occur on the lateral veins adjacent to the costa and along the veins to near the distal end. The position is best observed when the sporangia are immature. I interpret them as lateral rather than terminal on the veins. The apical growth of the leaves has been described as indefinite. Some leaves have undeveloped apices which may expand slowly; however they do terminate in a completely developed apex before the lower pinnae have deteriorated. The leaves are determinate and the lamina is imparipinnate. The spores are mostly tetrahedral and trilete as reported but a few spores have been observed which are bilateral and monolete.

From this survey of *Platyzoma* it was noted that there are certain similarities with the *Schizaeaceae*. A medullated protostele with sclerosed pith and inner endodermis are reported by Bower (1926) in species of *Anemia* and *Schizaea*. The rhizome in these genera has multicellular trichomes. Reduced filiform leaves with a central vascular trace and stomata are found in several species of *Schizaea* — *S. fistu-*

losa Labill., *S. papuana* Brause, and they are especially abundant in the North American *S. pusilla* Pursh. In the filiform leaves of *Platyzoma* the guard cells may be larger relative to the adjacent cells than in *Schizaea*, but the form of the intra-stomatal cells is similar. In the elongate pinnae which were found in one collection of *Platyzoma* there is a resemblance to the form of the lobes of the lamina in *Schizaea*. Since these pinnae have been found in only one specimen of *Platyzoma* they might be considered as abnormal. In the company of other similarities with *Schizaea*, I am inclined to regard them as something more than an anomalous condition. On the leaves of many species of *Anemia* and *Schizaea* there are 2- or 3-celled capitate glands. These are similar to the glands on the pinnae of *Platyzoma* although the basal cell may be larger and there is no yellowish indument. The sporangium of *Platyzoma* is most remarkable in its spherical shape, short stalk, its broad, more or less oblique annulus which is scarcely raised from the surface of the capsule, and especially in the undulating cell walls of the capsule faces. In *Mohria* and some species of *Anemia* the sporangia are spherical and short stalked or sessile. The cell walls of the capsule in *Schizaea melanesica* Sell. and *S. confusa* Sell. (Selling 1944b, 1947) are undulating and similar to those of *Platyzoma*. There is also similarity in the reticulate sculpture of the spores between *S. confusa* and *Platyzoma*. In his studies on the spores of *Schizaea* O. H. Selling (1944a) reports variations in size and sculpturing. In *S. fistulosa* there seem to be two sizes which show some correlation with the geographic distribution. It would be of interest to determine whether such variation in spore size in *Schizaea* and *Platyzoma* might be related to the apogamous condition as it is in species of *Pellaea* (Tryon & Britton, 1958).

In addition to an evaluation of similarities between *Platyzoma* and *Schizaea*, the distinctive character of the *Schizaeaceae* — the apical annulus — must be considered, and also the possibility of parallel reduction in these two genera. Resemblances in the sporangia are remarkable and

there is little possibility of parallel reduction in this structure. In *Platyzoma* the annulus is usually oblique — with unequal capsule faces, it is scarcely raised from the surface and is about one third the diameter of the capsule. There is a series of indurated cells in the stomial region and epidermal-like cells in the capsule faces. In these features the resemblance seems to be with *Schizaea* although there are similarities with species of *Anemia* and *Mohria* which have spherical sporangia, and in which there are several non-indurated cells in the apical portion of the sporangia. While the sporangia of *Platyzoma* are not identical to those of the *Schizaeaceae*, in this structure and in some aspects of the leaves there are resemblances closer to that group than to any other family.

There is also similarity to the *Polypodiaceae* particularly in the interruption of the annulus by the sporangium stalk. *Platyzoma* can be placed here in the subfamily *Gymnogrammoideae* and in the tribe *Gymnogrammeae* on the superficial sporangia following the course of the veins. In this tribe it would be allied to *Eriosorus* and *Jamesonia* by its monomorphic leaves and pubescent rhizome. It was tentatively placed here by Holttum (1956).

In the course of the preparation of a revision of *Jamesonia*, I have studied its species in some detail and wish to remark upon a number of characters of *Jamesonia* which differ from *Platyzoma*. The species of *Jamesonia* grow mainly on the South American páramos at altitudes from 2350 to 5000 meters. The species center in Colombia and Venezuela and occur northward into southern Mexico and southward to Bolivia and eastern Brazil. In the páramos *Jamesonia* is usually found growing in the shelter of rocks with grass or moss. The rhizomes are horizontal, creeping, dichotomously branched, with spirally arranged leaves, and are sparsely to densely covered with simple, multicellular trichomes. In some species the trichomes have more massive bases and become rather scale-like. The leaves in some but not all species are indeterminate and there are no reduced

or filiform leaves such as in *Platyzoma*. Young leaves are produced behind the apex on older parts of the rhizome and it is possible that these or a cluster of old petioles may have been the basis of the report of reduced leaves. A dense pubescence or glutinous exudate is characteristic of the leaves of *Jamesonia* but ceraceous indument is rare. It is indeed of such rare occurrence on the abaxial surface of the pinnae that it has been observed there in only one collection — the type of *J. ceracea* Maxon. It is perhaps in the form of the pinnae that *Jamesonia* and *Platyzoma* differ most markedly. The pinnae in *Jamesonia* are generally flat with the margins more or less enrolled. The margin is usually membranous or ciliate. The pinnae are relatively long stalked, rarely subsessile and in two species adnate. The venation of the pinnae is dichotomous with the ramifications branching and terminating usually in numerous ultimate veins which extend to or near the pinna margin. The form of the annulus may be somewhat irregular but there are generally about 20 raised and indurated cells. There is a distinct stomial region with 2 - 4 indurated lip cells which are smaller than those of the annulus. The sporangial stalk may be short — one quarter or less than the length of the capsule or equal to it in length. The spores of *Jamesonia* are entirely different from those of *Platyzoma* in the type of sculpture. They are trilete with 3 broad smooth or verrucate planes on the proximal face; there is a prominent equatorial ridge or wing and 3 broad ridges forming a triangle on the distal face. *Jamesonia* is a specialized group, closely related and with species transitional to *Eriosorus*. Although there is some resemblance between *Jamesonia* and *Platyzoma* the relationship is not a close one.

Platyzoma is properly excluded from the *Gleicheniaceae* and can, in the present classification, be placed in the *Polypodiaceae*. This disposition however, adds to the problems of the definition of that family. There is general agreement that the *Polypodiaceae*, as treated by Christensen, is polyphyletic but there is no clear understanding of the natural groups.

It is my belief that the *Schizaeaceae* is a source from which some of those groups have been independently derived. *Sinopteris* and some species of *Cheilanthes* have similarities with *Mohria; Eriosorus, Jamesonia* and *Pterozonium* comprise a group having certain resemblances to *Anemia*. While in *Platyzoma* there are similarities with *Schizaea* in the shape of the pinnae and lobes of the lamina, the filiform leaves, the spores and particularly in the structure of the sporangium.

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THE GENUS LECHEA *(CISTACEAE)* IN THE SOUTHEASTERN UNITED STATES

ROBERT L. WILBUR[1] AND HAZIM S. DAOUD

The genus *Lechea* is a small group of about seventeen species found only in North and Central America and in the West Indies. Actually all of the species occur in the United States east of the Rocky Mountains except for one little known and seldom collected endemic from western Cuba. *L. tripetala*, which is found in Oklahoma, occurs in the United States only as one small population widely separated from the principal area of the species in Mexico and Guatemala. The genus is particularly well-represented in the southeastern United States (here defined as the area east of Texas and Oklahoma and south of Missouri, Kentucky and Virginia) where ten species occur and four of them are endemic. *L. Torreyi* cannot rank as an endemic due to its puzzling reappearance in the pine forests of British Honduras. The variety of *L. Leggettii* found in the Southeast barely ranges beyond its borders but does occur in southeastern Virginia. No other region possesses so many species of the genus nor can claim so rich and varied an endemic element.

Lechea is most strongly and clearly distinguished from all other genera within the family by its trimerous, persistent corolla; sessile, fimbriate stigmas and the presence of three incomplete partititions within the capsule. Hence for all practical purposes there has never been any real confusion over generic limits. *Lechea* has usually been considered a difficult genus due to the rather minute technical characters upon which the species distinctions rest. The admirable revision of Hodgdon (1938) has provided a firm foundation for an understanding of the genus by clarifying species limits and evaluating morphological variation. The key provided, however, relies to a considerable degree upon characters not present during the season when most specimens

[1]Grateful acknowledgement is made to the National Science Foundation for a grant of research funds to Duke University (NSF-G5636) which were used in part for this study.

are collected, and therefore is not as usable as might be desired. Even plants collected with mature fruit and seeds often have not yet developed the basal shoots often called for in the key. These shoots are commonly not present until very late in the growing season. Although it does not now seem possible to prepare a key for sterile or even young flowering material, it is thought that the following key will aid in the determination of fruiting specimens of those species found in the southeastern United States.

Rafinesque (1836) in his monograph of the genus placed considerable emphasis upon the comparative lengths of the inner and outer sepals. The three subgenera recognized by him were actually largely characterized by the comparative lengths of the two whorls of the calyx. Since then most workers have placed considerable reliance upon this character. We too have found it a useful character and hence have employed it; but having seen considerable variation, especially in *L. racemulosa*, have felt it necessary to place this species under both leads of the key. Small's key (1933) is rendered almost unusable by too complete a reliance upon the constancy of this character. For example one would be in a quandary in attempting to determine a specimen of *L. villosa* with Small's key since in that species the outer sepals typically equal the inner and his key treats all species as having the outer lobes either longer or shorter than the inner sepals.

It was hoped when the present study was undertaken that it might result in some suggestions as to the relationships of the species and perhaps even a grouping of them into formal series or sections. Rafinesque recognized three subgenera based largely upon comparative lengths of the calycine whorls and also stamen and seed number. Spach in 1837 segregated the Texan species now known as *Lechea san-sabeana* as the monotypic genus *Lechidium* based largely upon the extreme development of the incomplete partitions found within the capsule. This taxon has since been treated as of subgeneric or sectional rank. Hodgdon accepted it as a section although admitting its close affinity to *L. tenuifolia*

and *L. tripetala*. Small (1933) in his treatment of the genus, covering almost the same area as that in this paper, segregated the species into five named groups whose rank, as is customary in Small's Manual, is undesignated. Hodgdon declined to provide formal subgeneric categories except for the section *Lechidium*. Although the genus seems admirably suited for the construction of a phylogenetic tree based upon the rather obvious reduction series, our data are not sufficiently complete for us to present a phyletic scheme.

We are accepting the nomenclature of Hodgdon's revision and are ignoring the perplexing monograph presented by Rafinesque in 1836. It seems probable, however, that some of the twenty new species published by Rafinesque will eventually prove identifiable and will have priority over some of the names now current.

In the course of this study more than 4000 herbarium specimens were examined and annotated. For having made their collections available to us in whole or in part, we are indebted to the curators of the herbaria indicated below by the abbreviations: BUS, CU, F, FLAS, FSU, GA, IA, KY, MICH, MISSA, NCSC, NCU, NO, NY, OS, PUL, SMU, TENN, TEX, UARK, USF, VDB, U. of So. Carolina.

KEY TO THE SOUTHEASTERN SPECIES OF LECHEA

1. Pubescence of aerial stems for the most part strongly divergent and spreading.
   2. Internal sepals conspicuously V- or U-shaped in cross-section with thin scarious margins and a roughened, often sparsely pilose keel (the sepal otherwise glabrous); leaves, or at least many of them, over 1:5 cm long; capsule thin-walled, readily splitting into 3 valves at maturity, subglobose, about equaling the calyx in length; widespread throughout much of the eastern United States .....1. *L. villosa*.
   2. Internal sepals but slightly bowed in cross-section with texture appearing uniform and pubescence scattered across surface; leaves all less than 1 cm long; capsule thick-walled, indehiscent; ellipsoid or somewhat rounded- barrel-shaped, exserted from the calyx for at least 1/3-1/2 its length; restricted to peninsular Florida .....2. *L. divaricata*.
1. Pubescence of aerial stems mostly closely appressed or lacking.
   3. External sepals equaling or exceeding the internal sepals in length.
      4. Calyx of fruit and of older flowers strikingly differentiated into an obconic to somewhat cylindrical base about 0.4-0.6 mm

long, shiny and yellowish in color and scarious in texture contrasting considerably with the texture, color and appearance of the inner sepals; pedicels (at least after anthesis) averaging 2 mm or more in length.....7. *L. racemulosa.*

4. Calyx-base of fruit and of older flowers not conspicuously differentiated in texture, color or appearance from the inner sepals; pedicels averaging less than 2 mm long.
   5. Capsule completely enclosed by sepals, stigma not exposed after anthesis; fruit and inner sepals together subglobose; cauline and rameal leaves averaging 10 or more times as long as broad.....3. *L. tenuifolia.*
   5. Capsule slightly to conspicuously exserted, the sepals not enclosing the top of the fruit; stigma exposed on developing and maturing fruit; fruit and inner sepals together cylindrical to pyriform (at least higher than broad); cauline and rameal leaves mostly less than 9 times as long as broad.
      6. External sepals at least one-fifth longer than the inner sepals and usually equaling or exceeding the capsule in length; capsule equaling or exceeding the inner sepals by not more than one-fifth its length; cauline leaves usually elliptic to elliptic-oblong, usually less than 5 times as long as wide, those below the inflorescence commonly appearing whorled and often more than 2 mm wide.....4. *L. minor.*
      6. External sepals about equaling the inner sepals and never equaling the capsule in length; capsule usually exceeding the inner sepals by about 1/3-1/2 its length; cauline leaves narrowly oblong to linear, usually 6 times (or more) as long as wide, those below the inflorescence alternate and less than 2 mm wide.....5. *L. patula*

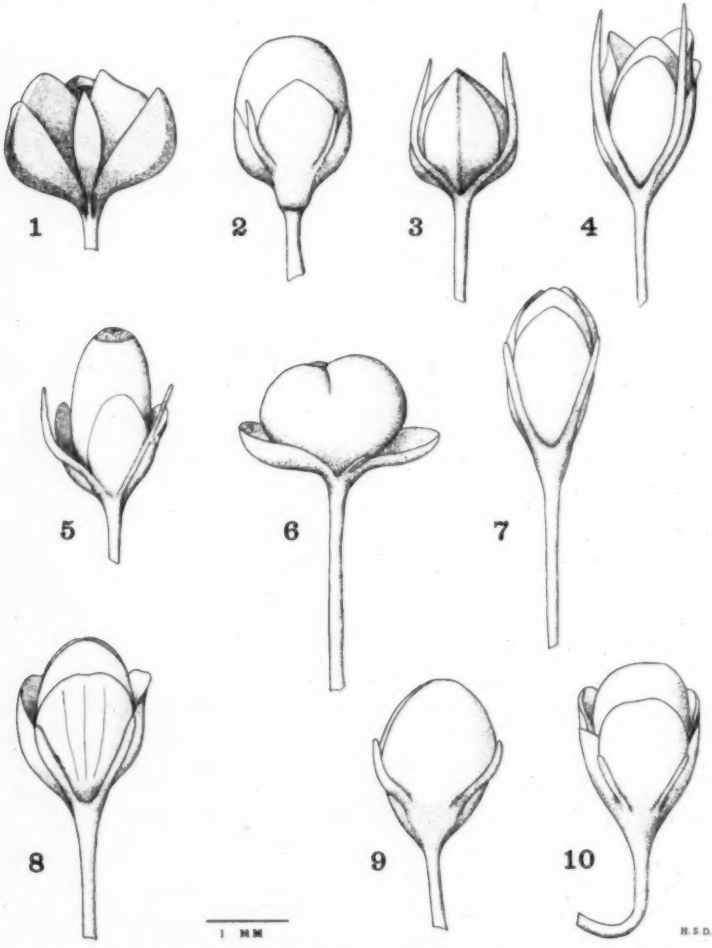
3. External sepals shorter than the internal sepals.
   7. Leaves pubescent on both upper and lower surfaces (at least those of the basal shoots conspicuously pilose above and below while the cauline and rameal leaves are usually inconspicuously pubescent over entire surface); flowers or fruits mostly clustered in 2's or 3's: capsule wall thickened and indurate; plants of peninsular Florida.....10. *L. cernua.*
   7. Leaves variously pubescent below but glabrous on upper surface; flowers or fruits not appearing fascicled (attached separately); capsule wall thin or at least not conspicuously indurate.
      8. Aerial stems perennial, suffruticose, clearly woody at base, with wiry woody branches; capsule exserted from the often spreading calyx by 1/3-1/2 its length; calyx

sparingly short-pubescent to glabrous; known only from southern Georgia and Florida.....6. *L. Deckertii.*

8. Aerial stems annual, herbaceous, dying to the base each year; capsule equaling the calyx or exserted not more than 1/5 its length from the closely enveloping sepals; calyx moderately to densely pilose.
   9. Capsule and calyx together narrowly obovoid, about twice as long as broad; capsule narrowly ellipsoid or ovoid, 1.5 times or more as long as broad; pedicel filiform, about 0.1 mm in diameter; basal leaves, when present, less than 5 times as long as wide; distribution primarily in the Piedmont and Mountains but also occurring in the Coastal Plain.....7. *L. racemulosa.*
   9. Capsule and calyx together broadly pyriform to obovoid, usually less than 1.5 times as long as broad; capsule ovoid to subglobose to broadly ellipsoid, about 1-1.3 times as long as broad; pedicel stout, at least 0.2 mm in diameter; basal leaves, when present, 6 or more times as long as wide; distribution typically of the Coastal Plain and the outer Piedmont.
      10. Leaves abruptly tapering at apex into a hardened, shiny, conical callosity about 0.25 mm long; inner sepal clearly 3-nerved (often best demonstrated by moistening); pedicels averaging over 1.5 mm long; capsule exceeding the sepals by about 1/5 its length; seeds mostly 2.....8. *L. Leggettii.*
      10. Leaves pointed but not differentiated into a callosity; inner sepal 1-nerved; pedicels averaging less than 1.5 mm long; capsule almost completely enveloped by the sepals; seeds mostly 3-6.....9. *L. Torreyi.*

1. **L. villosa** Ell. Hodgdon recognized three varieties of this species. The one found throughout much of eastern North America is var. *villosa* (=var. *typica* Hodgd.). Apparently overlapping the range of this eastern variety along the extreme western fringe of the species distribution is a relatively little collected plant of problematic distinctness called var. *macrotheca* Hodgd. Another variant of which there is too little material available for adequate appraisal is var. *Schaffneri* Hodgd. This is known only from a few stations in northeastern Mexico (Tamaulipas and San Luis Potosí). The conspicuously carinate inner sepals of *L. villosa* are diagnostic and together with several other distinc-

tive features make this species easy to recognize and perhaps indicate a relatively isolated position within the genus. As is to be expected in so widespread a species, considerable



FIGURES 1-10. Sepals and capsules of *Lechea* (pubescence not shown.) Fig. 1. *Lechea villosa;* fig. 2. *L. divaricata;* fig. 3. *L. tenuifolia;* fig. 4. *L. minor;* fig. 5. *L. patula;* fig. 6. *L. Deckertii;* fig. 7. *L. racemulosa;* fig. 8. *L. Leggettii;* fig. 9. *L. Torreyi:* fig. 10. *L. cernua.*

variation is encountered which is striking even within the range of var. *villosa*.

In the course of our studies two collections were examined that seemed definitely to be hybrids between *L. villosa* and *L. racemulosa*. As both of these species are extremely wide-ranging and in part share broadly overlapping areas, it is no doubt indicative of the effectiveness of whatever isolating mechanisms that they possess that so little evidence of hybridization was encountered. The putative hybrids were both collected from the sandy inner margin of the Coastal Plain at the outer margin of the range of *L. racemulosa*. One (*Radford 26436* NCU) was from Edgefield Co., S. Carolina and the other (*Wiegand & Manning 2072* CU) was collected in Moore Co., N. Carolina. The spreading stem pubescence of these plants resembles that of *L. villosa* and the sepals are keeled, but not so strongly, as they are in *L. villosa*. The leaves are shaped more like those of *L. racemulosa* and the shape of the inflorescence also is more like that species.

RANGE: The typical variant occurs beyond our area as far north as southern New Hampshire and as far west as eastern Texas and into Illinois.

Specimens examined from the following counties: NORTH CAROLINA: Anson, Bladen, Brunswick, Carteret, Cherokee, Cleveland, Craven, Cumberland, Currituck, Dare, Duplin, Greene, Halifax, Harnett, Hyde, Iredell, Johnston, Jones, Lenoir, Montgomery, Moore, New Hanover, Northampton, Onslow, Pender, Richmond, Robeson, Scotland, Wake, Wayne, Wilson. SOUTH CAROLINA: Aiken, Allendale, Barnwell, Beaufort, Calhoun, Charleston, Chesterfield, Clarendon, Colleton, Darlington, Dillon, Dorchester, Edgefield, Fairfield, Florence, Georgetown, Hampton, Horry, Lancaster, Lee, Lexington, Marion, Marlboro, McCormick, Newberry, Orangeburg, Richland, Saluda, Sumter, Williamsburg. GEORGIA: Atkinson, Baker, Brantley, Charlton, Clay, Decatur, Dougherty, Echols, Glynn, Jones, McDuffie, McIntosh, Pierce, Richmond. FLORIDA: Alachua, Citrus, Clay, Columbia, Dixie, Duval, Escambia, Franklin, Gilchrist, Hamilton, Hernando, Lake, Liberty, Leon, Levy, Madison, Manatee, Nassau, Okaloosa, Putnam. TENNESSEE: Bledsoe, Chester, Coffee, Dickson, Fayette, Franklin, Gibson, Henderson, Hickman, Lawrence, Lewis, McNairy, Montgomery, Rutherford, Sumner. ALABAMA: Jefferson, Lee, Mobile, Montgomery, Sumter, Tallapoosa. MISSISSIPPI: Clarke, Hancock, Harrison, Hinds, Jackson, Jef-

ferson, Lafayette, Lincoln, Monroe, Oktibbeha, Pike. LOUISIANA: Allen, Caddo, Claiborne, Grant, Jackson, Lincoln, Rapides, Sabine, Tangipahoa, Union, Vernon, West Feliciana. ARKANSAS: Baxter, Benton, Calhoun, Clark, Cleveland, Columbia, Conway, Dallas, Drew, Faulkner, Garland, Hempstead, Independence, Izard, Jefferson, Johnson, Logan, Marion, Miller, Phillips, Pike, Prairie, Pulaski, Saline, Sevier, Stone, Union, Washington.

2. **L. divaricata** Shuttlew. ex Britt. A most distinctive species restricted in range to southern peninsular Florida. In our key, *L. divaricata* keys out next to *L. villosa* with which it was long confused (or at best treated as a Floridian variant). Hodgdon comments upon their relationship as follows: "It would be difficult to find any *Lechea* differing more from *L. villosa* in everything except quality of pubescence and the general shape of the leaves, both of which are vegetative characters and not in themselves necessarily indicative of close relationship." Hodgdon placed more confidence in the characters of the fruit which he felt indicated the relationships of this species to be closest to *L. Deckertii* and *L. patula*. As is usual when facts are few, speculation is unfettered; obviously too little is known at present to be at all dogmatic about relationships. Although *L. divaricata* is an isolated species, its relationships would seem to us somewhat closer to *L. villosa* than to *L. Deckertii* or *L. patula*.

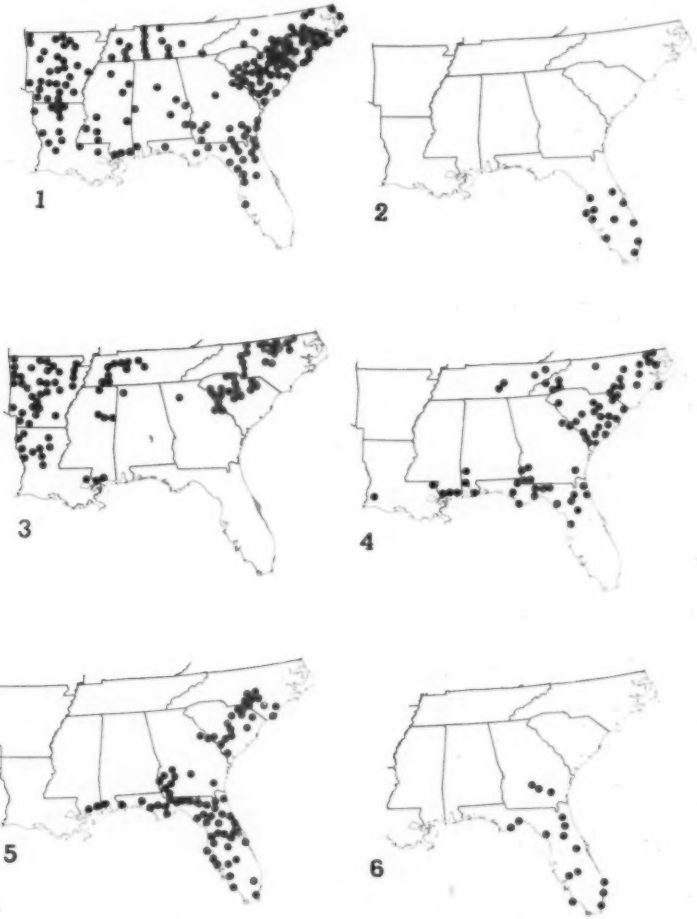
RANGE: Endemic to the southern half of peninsular Florida but apparently absent from the Keys.

Specimens examined from the following counties of Florida: Brevard, Broward, Dade, Hernando, Highlands, Hillsborough, Lee, Manatee, Martin, Pinellas, Seminole.

3. **L. tenuifolia** Michaux. A widespread species easily recognized by its very narrowly linear leaves (usually 1.5 mm or less wide), globose capsules and enveloping calyx, and its external sepals that are equal to or more commonly exceed the inner. According to Hodgdon's treatment our representatives of this species belong to var. *tenuifolia* which is distinguished by its smaller stature, fruit and seeds from var. *occidentalis* Hodgd. whose range it somewhat overlaps only in northwest Illinois. In our area it can be confused in the young flowering stages with *L. patula* and in such

cases the greater degree of pubescence and coarseness of the trichomes of *L. tenuifolia* are the best guide to its identity.

RANGE: Hodgdon's typical variety extends beyond our area as far north as southern Maine and as far west as Minnesota and eastern Texas.



MAPS 1-6. Distribution of *Lechea* in the Southeastern United States. Map 1. *Lechea villosa;* map 2. *L. divaricata;* map 3. *L. tenuifolia;* map 4. *L. minor;* map 5. *L. patula;* map 6. *L. Deckertii.*

Specimens examined from the following counties: NORTH CAROLINA: Cabarrus, Caswell, Davie, Edgecombe, Durham, Forsyth, Franklin, Granville, Halifax, Harnett, Lee, Northampton, Orange, Person, Rowan, Stokes, Union, Vance, Wake, Warren. SOUTH CAROLINA: Abbeville, Anderson, Cherokee, Chester, Chesterfield, Darlington, Fairfield, Greenwood, Laurens, Lee, Lexington, McCormick, Newberry, Richland, York. GEORGIA: Cherokee, McDuffie, Richmond. TENNESSEE: Benton, Carroll, Chester, Davidson, Dickson, Hardeman, Hickman, Humphreys, McNairy, Rutherford. ALABAMA: Colbert. MISSISSIPPI: Benton, Hancock, Harrison, Lowndes, Oktibbeha, Webster. LOUISIANA: Bossier, Caddo, Caldwell, DeSoto, Grant, Natchitoches, Ouachita, Rapides, Sabine, St. Tammany, Winn. ARKANSAS: Baxter, Benton, Clark, Columbia, Conway, Crawford, Craighead, Dallas, Drew, Faulkner, Franklin, Garland, Greene, Hempstead, Hot Springs, Independence, Izard, Logan, Marion, Miller, Newton, Ouachita, Poinsett, Prairie, Pulaski, St. Francis, Saline, Sebastian, Sevier, Stone, Washington, White, Yell.

4. **L. minor** L. The type-species of the genus. The only other named by Linnaeus, *L. major*, has been shown to be a synonym of *Helianthemum canadense* (L.) Michx. As was pointed out by Britton (1894), Linnaeus had compounded under *L. minor* at least two other species, *L. villosa* and *L. maritima*, but Britton's typification of the species, although at variance with previous interpretations, has been universally accepted. The species presents few problems in identification as it is easily distinguished by its long external sepals and the comparatively broad and often apparently whorled leaves beneath the inflorescence branches.

RANGE: This species extends north of our area to southern New Hampshire and from there west across southern Ontario to the area of Illinois about Chicago.

Specimens examined from the following counties: NORTH CAROLINA: Bertie, Buncombe, Carteret, Cumberland, Duplin, Edgecombe, Forsyth, Gates, Greene, Harnett, Henderson, Hertford, Hoke, Robeson, Scotland, Swain, Transylvania, Wake, Washington. SOUTH CAROLINA: Aiken, Allendale, Anderson, Beaufort, Berkeley, Charleston, Clarendon, Colleton, Dillon, Dorchester, Georgetown, Hampton, Horry, Jasper, Kershaw, Lee, Lexington, Sumter, Williamsburg. GEORGIA: Brantley, Calhoun, Decatur, Early, McDuffie, Seminole, Richmond. FLORIDA: Alachua, Bay, Bradford, Dixie, Duval, Gulf, Hernando, Jackson, Jefferson, Leon, Madison, Marion, St. Johns, Wakulla. TENNESSEE: Coffee, Hamblen, Knox, Warren. ALABAMA: Baldwin, Mobile, Washington. MISSISSIPPI: Hancock, Harrison, Jackson. LOUISIANA: Calcasieu, Washington.

5. **L. patula** Legg. A species of such variability that Small (1933) recognized three species. Hodgdon, after a careful appraisal of the suggested differences, could accept but one. The three species were placed by Small in two different informally named groups. The group "Longisepalae" contained *L. patula* and *L. prismatica* Small while his *L. exserta* was assigned to the group "Brevisepalae". Characteristic features of *L. patula* are its narrowly linear cauline leaves, its sepals that usually either nearly equal one another or the outer ones somewhat the longer, its conspicuously exserted capsule capped by the striking reddish-brown fimbriate stigmas and very loosely enveloped about its basal half (to two-thirds) by the calyx.

RANGE: Endemic to the southeastern Coastal Plain.

Specimens examined from the following counties: NORTH CAROLINA: Bladen, Brunswick, Cumberland, Harnett, Hoke, Moore, Pender, Richmond, Scotland. SOUTH CAROLINA: Aiken, Allendale, Bamberg, Calhoun, Chesterfield, Darlington, Jasper, Kershaw, Marion, Marlboro, Orangeburg, Richland, Williamsburg. GEORGIA: Baker, Ben Hill, Brantley, Clay, Decatur, Dougherty, Lee, McDuffie, Miller, Randolph, Richmond, Sumter. FLORIDA: Alachua, Bay, Bradford, Brevard, Broward, Calhoun, Collier, Columbia, Dade, Dixie, DeSoto, Duval, Escambia, Flagler, Franklin, Gadsden, Gilchrist, Hernando, Highlands, Jefferson, Lake, Liberty, Lee, Leon, Levy, Madison, Manatee, Marion, Orange, Pasco, Pinellas, Polk, Putnam, Sarasota, Seminole, Suwannee, Sumter, Volusia, Walton. ALABAMA: Mobile. MISSISSIPPI: Harrison, Jackson.

6. **L. Deckertii** Small (including *L. myriophylla* Small). An unmistakable species distinguished by its suffruticose habit, more or less globose fruit with thin papery walls tardily dehiscent at maturity, and its exceedingly short external sepals and often strongly divergent inner sepals. Small (1933) distinguished two species by means of the following key to his group "Myriophyllae".

Leaf-blades subulate to elliptic-subulate: capsule depressed-globose. .....13. *L. Deckertii.*

Leaf-blades elliptic, sometimes narrowly so: capsules globose..... .....14. *L. myriophylla.*

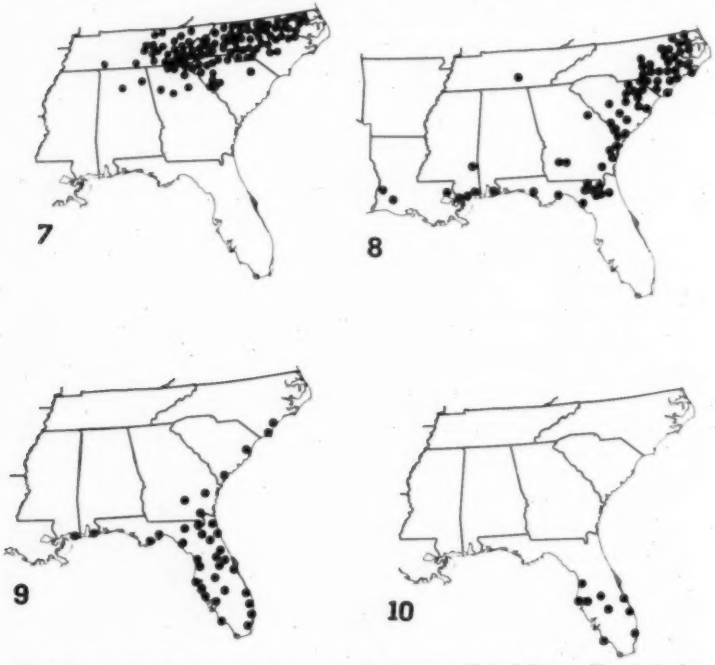
Hodgdon concluded that these were merely growth-differences. He found that there did seem to be a difference in calyx pubescence between the two populations described

as separate species by Small with *L. myriophylla* having a nearly glabrous calyx. He concluded however that these largely vegetative variants could be included within the bounds of one species. We have seen considerably more material than was available to Hodgdon and our conclusion is no different than his.

RANGE: Known only from the Coastal Plain of southern Georgia and throughout much of Florida.

Specimens examined from the following counties: GEORGIA: Ben Hill, Coffee, Pierce. FLORIDA: Broward, Clay, Collier, Dade, DeSoto, Franklin, Highlands, Levy, Marion, Orange, Palm Beach, Putnam, Wakulla.

7. **L. racemulosa** Michx. The Appalachian distribution pattern of this species has been modified by a migration onto the Coastal Plain from upper North Carolina to Long Island (but scarcely at all further south) and by its sporadic



MAPS 7-10. Distribution of *Lechea* in the southeastern United States. Map 7. *Lechea racemulosa;* map 8. *L. Leggettii;* map 9. *L. Torreyi;* map 10. *L. cernua.*

occurrence in parts of the glaciated Midwest. It is distinguished by its relatively long, slender pedicels and its conical, hardened shiny calyx-base. It apparently rarely hybridizes with *L. villosa* under which name the intermediates are discussed.

RANGE: Extending north of our area to Long Island and southern Ohio and Indiana. Reappearing in Indiana on the shore of Lake Michigan and also in eastern Missouri.

Specimens examined from the following counties: NORTH CAROLINA: Alamance, Alexander, Alleghany, Anson, Bertie, Buncombe, Burke, Cabarrus, Caldwell, Caswell, Catawba, Chatham, Cherokee, Chowan, Clay, Cumberland, Davidson, Davie, Durham, Edgecombe, Forsyth, Franklin, Gates, Graham, Granville, Greene, Guilford, Halifax, Harnett, Haywood, Henderson, Hertford, Iredell, Jackson, Johnston, Lee, Lincoln, Macon, Martin, McDowell, Mecklenburg, Mitchell, Montgomery, Moore, Nash, Northampton, Orange, Person, Pitt, Polk, Randolph, Richmond, Rockingham, Rowan, Rutherford, Sampson, Stanly, Stokes, Surry, Swain, Transylvania, Union, Wake, Warren, Watauga, Wilson, Yadkin, Yancey. SOUTH CAROLINA: Anderson, Cherokee, Darlington, Edgefield, Greenville, Greenwood, Laurens, McCormick, Oconee, Pickens, Saluda, Spartanburg, York. GEORGIA: Clarke, DeKalb, Fanin, Habersham, Paulding, Rabun, Union. TENNESSEE: Bledsoe, Blount, Cocke, Cumberland, Fentress, Franklin, Grainger, Hamilton, Hawkins, Knox, Monroe, Polk, Rhea, Roane, Scott, Sevier, Van Buren, Wayne, White. ALABAMA: Cullman, De Kalb.

8. **L. Leggettii** Britt. & Holl. Hodgdon treats the variant occurring in the South as var. *ramosissima* Hodgd. His two other varieties are found in the Northeast and Midwest. For the most part *L. Leggettii* is restricted to the Coastal Plain but surprisingly one collection from central Tennessee seemed to belong here and adds to the list of Coastal Plain plants found as disjuncts in Tennessee or Kentucky. The most striking vegetative characteristic of this species is the hardened, conical apex of the leaf. The short external sepals, the 3-nerved inner sepals and the subglobose to pyriform fruiting calyx are a combination of characters which render this species rather easily identified.

RANGE: var. *ramossissima* Hodgd., which alone occurs in the Southeast ranges beyond that region only into southeastern Virginia.

Specimens examined from the following counties: NORTH CAROLINA: Bertie, Beaufort, Bladen, Brunswick, Carteret, Chatham, Chowan, Columbus, Craven, Cumberland, Duplin, Edgecombe, Gates, Greene, Harnett, Hoke, Jones, Lee, Martin, Nash, Northampton, Onslow, Pamlico, Pender, Pitt, Robeson, Sampson, Scotland, Washington, Wilson. SOUTH CAROLINA: Allendale, Beaufort, Chesterfield, Darlington, Dillon, Dorchester, Florence, Georgetown, Hampton, Jasper, Lee, Lexington, Orangeburg, Sumter, Williamsburg. GEORGIA: Brantley, Chatham, Dougherty, Liberty, McDuffie, McIntosh, Worth. FLORIDA: Baker, Bay, Bradford, Clay, Columbia, Dixie, Hamilton, Suwanee, Union, Wakulla. TENNESSEE: Coffee. ALABAMA: Baldwin. MISSISSIPPI: Hancock, Harrison, Jackson, Wayne. LOUISIANA: Beauregard, Jefferson Davis, St. Tammany.

9. **L. Torreyi** Legg. ex Britt. It seems probable that both Britton (1894) and Small (1903, 1933), in attributing to *L. maritima* Legg. ex Britt. a range as far south as Georgia, actually mistook some specimens of *L. Torreyi* for it. *L. maritima* is not known south of Virginia. Leggett (1878) pointed out that there are two distinguishable elements within the populations now covered by *L. Torreyi.* The differences were largely overlooked until Hodgdon (1938) treated the two as varieties distinguished by him more or less as follows:

Var. *Torreyi:* Seeds 4-6; calyx dark brown to slightly ferruginous and densely pilose with cinereous pubescence; fruit somewhat loosely arranged or scattered.

Var. *congesta:* Seeds 3; calyx usually markedly ferruginous and pubescence not conspicuously cinereous; fruit densely clustered.

The typical element was thought by Hodgdon to be restricted to Florida where var. *congesta* also was abundantly represented but which in addition ranged as far north as southeastern North Carolina and west into Mississippi. There is neither geographic segregation of the two types within peninsular Florida nor from the scanty information available is there any ecologic separation. The morphological differences are certainly not striking or clear-cut and, with the exception of the number of seeds in each capsule, are rather subjective in nature. Our study has not been exhaustive but we chose not to recognize the two varieties. More material and habitat information are required before

a proper evaluation of them can be made. We would like to reemphasize that Hodgdon reports the reappearance of this species (the 3-seed variant) about 800 miles across the Gulf of Mexico in the pine forests of British Honduras.

A far more conspicuous variant has come to our attention and is represented by two sheets in the Buswell Herbarium from the "Sandy scrub above Fort Lauderdale." It is completely glabrous (leaves, stems and calyx) and of a dark reddish brown. There is but one vein in the inner sepal and that is strongly elevated — so much so as to form almost a keel. This vein extends to the very apex of the sepal. We have seen nothing remotely approaching these specimens but feel it best not to recognize them formally until more is known about the population to which they belong.

RANGE: The range of this species is shown by the accompanying map except for the reappearance of the species in British Honduras.

Specimens examined from the following counties: NORTH CAROLINA: Brunswick, Pender. SOUTH CAROLINA: Beaufort, Georgetown. GEORGIA: Charlton, Coffee, Long. FLORIDA: Alachua, Baker, Bradford, Brevard, Broward, Charlotte, Citrus, Collier, Dade, Dixie, Duval, Franklin, Hernando, Highlands, Lake, Lee, Manatee, Martin, Orange, Palm Beach, Pinellas, Polk, Putnam, St. Johns, Sarasota, Seminole, Suwannee, Volusia, Wakulla. ALABAMA: Baldwin. MISSISSIPPI: Jackson.

10. **L. cernua** Small. The species is so unlike any other within the genus that it is strange that it was overlooked until Small described it in 1924. The flowers and fruits are borne in clusters of 2-4 on stiff, often reflexed pedicels and the leaves are at least minutely pubescent upon both surfaces. The fruits are 1-2-seeded with thickened valves. The species is as distinctive as any within the genus including *L. san-sabeana* (Buckl.) Hodgd., which alone has been provided with a separate formal category by students of the genus.

RANGE: Endemic to peninsular Florida.

Specimens examined from the following counties in Florida: Broward, Collier, Hernando, Highlands, Hillsborough, Indian River, Martin, Pinellas, Polk. — DEPARTMENT OF BOTANY, DUKE UNIVERSITY.

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MENTZELIA ALBESCENS AND LONICERA XYLOSTEUM IN MISSOURI. — While botanizing near Joplin, Missouri, recently I came upon a plant, obviously belonging to the family *Loasaceae*, which I did not recognize; and I was unable to find it in either the eighth edition of Gray's Manual or in Britton and Brown's Illustrated Flora.

It proved to be *Mentzelia albescens* (Gill.) Griseb., previously known only from much farther west, ranging from New Mexico and Texas through Mexico and to Argentina and Chile. The plant was described by Gray as *Mentzelia Wrightii* in Plantae Fendlerianae Novi-Mexicanae, Mem. Amer. Acad. 4: 48. 1849; and there are several other synonyms. The determination was confirmed by Dr. Robert E. Woodson, curator of the herbarium, Missouri Botanical Garden.

Where first found, the plant was growing on mine dumps, perhaps at least fifty or sixty years old, on the north side of Turkey Creek about 2½ miles n. w. of Joplin, Missouri. The dumps consist of crumbling limestone and dolomite with fragments and boulders of chert and limestone; and practically no other vegetation was growing on them. The plants here were rather abundant, 3-5 dm. high, nearly simple or a little branched above. My collection data is No. *69221*, Aug. 27, 1960.

A few days later I again found the plant growing on chat piles of old mines about two miles up Turkey Creek and about a half mile n. w. of Joplin. The record here is No. *69227*, along Loan Elm Road, Aug. 30, 1960.

Then on Sept. 9th, 1960, while collecting near Carl Junction, Jasper County, Missouri, about ten miles n. w. of the Joplin localities, I again found the plant growing on chat piles of abandoned mines, about a mile and a half from the town. The plants here were more abundant and averaged larger in size than at the Joplin localities; some of them were up to 7-8 dm. high and more widely branched above the middle. The collection No. is *69263*.

The chat piles, on which *Mentzelia albescens* was growing, consist of crushed chert with a smaller admixture of limestone or dolomite or both from which the lead and zinc ore has been extracted. Because of its loose dry nature and the presence of alkalies and sulphides, the surface, if undisturbed, remains sterile for many years, and no plant life can find lodgment on it. However, it seems that this southwestern desert plant has found it to be a congenial habitat, for it is becoming abundant and is well established at all of the localities given above. Specimens of all the collections mentioned are deposited in the Ernest J. Palmer private herbarium, Webb City, Missouri. Duplicates of some of them will be sent to the Gray Herbarium, the herbarium of the Missouri Botanical Garden, and to other herbaria.

Lonicera Xylosteum L. is another recent collection that appears to be new to the Missouri flora, though not to that of the Manual Range. A large plant was found growing in open upland woods, along a bank of an old electric railway grade, about half a mile north of Joplin, Missouri. It was collected under my No. *69188*, Aug. 6, 1960. The range given for this introduced species in the eighth edition of Gray's Manual is N. E. to Mich., s to N. J., Penn. and O. — ERNEST J. PALMER, WEBB CITY, MISSOURI.

A NEW VARIETY OF RUDBECKIA FULGIDA. — *Rudbeckia fulgida* Ait. var. *auriculata* var. nov. Folia radicalia elliptica, lamina 15-25 cm. longa, 5-8 cm. lata, acuta, basi attenuata; folia caulina acuta, integra vel grosse serrata; folia caulina inferiora sessilia, pandurata vel spatulata, basi angustata, auriculata; folia caulina mediocria sessilia pandurata, basi lata, auriculata; folia caulina superiora sessilia ovata vel ovato-lanceolata, auriculata vel truncata.

Basal leaves elliptical, blade 15 to 25 cm. long, 5-8 cm. wide, acute, the base attenuate into a petiole that is ½ as long to as long as the blade; cauline leaves acute, coarsely and irregularly serrate; lower cauline leaves sessile, pandurate with a narrow base or spatulate, strongly auriculate, those nearest the base (nodes 1-3) occasionally elliptic-spatulate but sessile and auriculate; middle cauline leaves sessile, pandurate with a broad base, strongly auriculate; upper cauline leaves and bracts subtending the branches sessile, ovate to ovate-lanceolate, auriculate or truncate.

TYPE: Moist soil along Alabama Highway 55, 11 miles south of McKenzie (2 miles north of Red Level), Covington Co., Alabama, *R. E. Perdue, Jr. 2177*, July 24, 1958. Type in the Gray Herbarium, isotype in the U. S. National Herbarium.

This variety is very distinct from the others of *R. fulgida*. In my key to the varieties of this species[1], the plant described here keys out to either *R. fulgida* var. *fulgida* or *R. fulgida* var. *spathulata* (Michx.) Perdue. Variety *auriculata* is readily distinguished from each of these as well as from its other relatives by the typically auriculate leaves of the lower and middle parts of the stem.

I first collected the new variety in very immature condition during the summer of 1952. Not until 1958 was I able to return to the original locality and obtain additional specimens to provide a basis for the description of this new variety. My original collection was taken from a small colony extending about 25 feet along a ditchbank and consisting of about 25 or 30 individual plants. When I made the second collection, 6 years later, the colony had expanded to several hundred plants extending along the ditchbank for some 300 feet. On two separate occasions I looked extensively elsewhere in the vicinity of the type locality without finding other plants of this variety. — ROBERT E. PERDUE, JR., U. S. DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE, CROPS RESEARCH DIVISION, BELTSVILLE, MARYLAND.

[1]Synopsis of *Rudbeckia* subgenus *Rudbeckia*. RHODORA 59 (708): 293-299 (1957).

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